

Claims:

1. A device comprising:

- a) a rotating support having a surface, the surface at least partially covered with a removable substrate of limited length;
- b) at least one pick-and-place roll that is nipped against the substrate on the support and whose period of rotation is not equal to the period of rotation of the support;
- c) a coating applicator for applying a quantity of coating liquid to the substrate or to the pick-and-place roll; and
- d) a motion device that rotates the support and substrate for a plurality of revolutions whereby wetted surface portions of the pick-and-place roll repeatedly contact the substrate.

2. A device according to claim 1 comprising at least two pick-and-place rolls.

3. A device according to claim 2 wherein the pick-and-place rolls do not have the same period of rotation.

4. A device according to claim 2 wherein the pick-and-place rolls have the same period of rotation.

5. A device according to claim 1 wherein the period of rotation of a pick-and-place roll can be dynamically changed during operation of the device to reduce or minimize coating defects.

6. A device according to claim 1 wherein a pick-and-place roll can be operated at a fixed or variable surface speed differential relative to the surface speed of the support.

7. A device according to claim 6 wherein the surface speed differential can be varied sinusoidally as the support is revolved.

8. A device according to claim 1 wherein a pick-and-place roll has a period of rotation that is not periodically related to the period of rotation of the substrate.
- 5 9. A device according to claim 8 wherein a period of rotation of the support or of a pick-and-place roll can be varied during operation of the device to reduce or minimize coating defects.
10. A device according to claim 1 wherein the size or position of the support or of a pick-and-place roll can be varied during operation of the device to reduce or minimize coating defects.
- 10 11. A device according to claim 1 wherein a pick-and-place roll has a dimensionless roll size between 0.02 to 0.195, 0.255 to 0.28, 0.34 to 0.36 and 0.44 to 0.48.
12. A device according to claim 1 wherein the coating applicator applies a discontinuous coating.
- 15 13. A device according to claim 1 wherein the coating applicator applies the coating as a pattern of stripes.
14. A device according to claim 13 wherein the pattern has a dimensionless stripe width less than about 0.2.
15. A device according to claim 13 wherein the pattern has a dimensionless stripe width between about 0.05 and about 0.15.
- 20 16. A device according to claim 1 wherein the coating applicator applies the coating as a pattern of drops.
17. A device according to claim 16 wherein the pattern is discontinuous.
18. A device according to claim 1 wherein the device converts a discontinuous coating to a continuous, void-free coating.
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19. A device according to claim 18 wherein the converted coating has a dimensionless minimum caliper greater than about 0.9.

20. A method comprising:

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- a) providing a rotating support having a surface, the surface at least partially covered with a removable substrate of limited length and, in either order:
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- i) nipping the substrate between the support and at least one pick-and-place roll whose period of rotation is not equal to the period of rotation of the support; and
- ii) applying a quantity of coating liquid to the substrate or to the pick-and-place roll; and
- b) rotating the support and substrate for a plurality of revolutions whereby wetted surface portions of the pick-and-place roll repeatedly contact the substrate.

21. A method according to claim 20 comprising at least two pick-and-place rolls.

15 22. A method according to claim 21 wherein the pick-and-place rolls do not have the same period of rotation.

23. A method according to claim 21 wherein the pick-and-place rolls have the same period of rotation.

20 24. A method according to claim 20 wherein the period of rotation of a pick-and-place roll can be dynamically changed to reduce or minimize coating defects.

25. A method according to claim 20 wherein a pick-and-place roll can be operated at a fixed or variable surface speed differential relative to the surface speed of the support.

25 26. A method according to claim 25 wherein the surface speed differential can be varied sinusoidally as the support is revolved.

27. A method according to claim 20 wherein a pick-and-place roll has a period of rotation that is not periodically related to the period of rotation of the substrate.
- 5 28. A method according to claim 27 wherein a period of rotation of the support or of a pick-and-place roll can be varied during operation of the device to reduce or minimize coating defects.
29. A method according to claim 20 wherein the size or position of the support or of a pick-and-place roll can be varied to reduce or minimize coating defects.
- 10 30. A method according to claim 20 wherein a pick-and-place roll has a dimensionless roll size between 0.02 to 0.195, 0.255 to 0.28, 0.34 to 0.36 and 0.44 to 0.48.
31. A method according to claim 20 wherein the applied coating is discontinuous.
32. A method according to claim 20 wherein the applied coating is a pattern of stripes.
- 15 33. A method according to claim 32 wherein the pattern has a dimensionless stripe width less than about 0.2.
34. A method according to claim 32 wherein the pattern has a dimensionless stripe width between about 0.05 and about 0.15.
- 20 35. A method according to claim 20 wherein the applied coating is a pattern of drops.
36. A method according to claim 35 wherein the pattern is discontinuous.
37. A method according to claim 20 wherein the applied coating is converted to a continuous, void-free coating.
- 25 38. A method according to claim 37 wherein the converted coating has a dimensionless minimum caliper greater than about 0.9.

39. A method according to claim 20 wherein the applied coating is converted to a void-free coating having an average caliper less than 5 micrometers.
40. A method according to claim 20 wherein the applied coating is converted to a void-free coating having an average caliper less than 1 micrometer.
- 5 41. A method according to claim 20 wherein the applied coating is converted to a void-free coating having an average caliper less than 0.5 micrometers.
42. A method according to claim 20 wherein the dimensionless stripe width and dimensionless roll size are within a white region depicted in **Fig. 4**.
- 10 43. A method according to claim 20 wherein there are at least two pick-and-place rolls and the dimensionless stripe width and dimensionless roll size are within a white region depicted in **Fig. 11**.
44. A method according to claim 20 wherein there are at least two pick-and-place rolls and the dimensionless stripe width and dimensionless roll size are within a white region depicted in **Fig. 12**.